Improvement of Quality Metrics in Patients with Ischemic Vascular Disease (IVD), Coronary Artery Disease (CAD), and Congestive Heart Failure (CHF)

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Abstract
To improve the quality of care for patients with cardiovascular disease, three evidence-based metrics were researched and reviewed. These metrics were for patients with ischemic vascular disease (IVD) for whom an antiplatelet medication is recommended, patients with coronary artery disease (CAD) and either left ventricular systolic dysfunction (LVSD) or diabetes mellitus for whom ACE inhibitors/ARBs are recommended, and patients with congestive heart failure (CHF) and LVSD for whom beta-blockers are recommended. The goals were to identify patients from the Lehigh Valley Physician's Group (LVPG) whose care was not in compliance with these guidelines, standardize the documentation of allergies, contraindications, and intolerances to improve the accuracy of the metrics, and educate providers to prescribe the medications when appropriate. The most common reason for gaps in documented care was found to be the lack of transferred medication lists from CPO to EPIC approximately 6 months post-implementation of the new EMR. Other reasons included many relative contraindications for which providers could receive credit for through appropriate documentation. Through extensive chart review and "registry clean-up", team-based care supported by the creation of sustainable workflow process, and provider and medical staff education, an increase in the percentage of patients meeting metric guidelines within specific practices was achieved. The increase varied between practices: 5.9-27.64% for antiplatelet use in patients with IVD documented, 8.3-16.3% for beta-blocker use in CHF, and 4.1% for ACE/ARBs.

Keywords
Quality improvement, process improvement, standard of care, ischemic vascular disease, anti-platelet, coronary artery disease, ACE inhibitors/ARBs, congestive heart failure, beta blockers

Introduction

Cardiovascular disease and stroke are the leading cause of death both in the United States and globally.[1,2] The medical costs for these illnesses reach into the hundreds of billions of dollars annually[4]. On a local level, more than 1 in 4 deaths in Pennsylvania are attributed to heart disease.[5] The coronary heart disease (CHD) death rate for from 2008-2012 was found to be 99.2 per 100,000 people in Lehigh County and 107.4 per 100,000 in Northampton County[5], both major regions from which LVPG draws its patients. Although the human and financial cost of CVD is shocking, these numbers have decreased by more than 60% since 1950.[1] This is largely the result of public health efforts and standardized care protocols, including use of aspirin, angiotensin-converting enzyme inhibitors/angiotensin receptor blockers (ACE inhibitors/ARBs), and beta-blockers for secondary prevention, showing that adherence to evidence-based guidelines can hugely impact hospitals and patients alike.

Medicare's Shared Savings Program, in which LVHN participates, requires Accountable Care Organizations (ACOs) to demonstrate adherence to thirty-three quality standards tracked by each ACO[3]. Among these thirty-three metrics are those examined in this project, specifically chosen to focus on outpatient cardiac health. The first metric includes patients with a diagnosis of IVD 18 years or older with documented use of aspirin or other antiplatelet agent. The goal for the organization, based on national benchmarks, is to ensure greater than 77.7% of patients with IVD are on anti-platelet therapy[3]. The second metric includes patients with a diagnosis of CHF and LVSD, defined as an ejection fraction less than 40%, who are taking a beta-blocker; the goal is to have more than 83.4% of patients in adherence[3]. The final metric includes patients with a diagnosis of CAD as well as diabetes mellitus (DM) or left ventricular systolic dysfunction (LVSD) who are taking an ACE inhibitor or ARB. The goal for this metric is 70.8%[3].

For the metrics chosen, it is important to note that certain exclusion criteria are allowable under Medicare. While there are no exclusions for the anti-platelet metric, the beta-blocker metric allows exceptions for medication allergy, contraindication,

or intolerance, such as low blood pressure, asthma, or patient refusal of the medication. Medicare also specifies similar exclusions for the ACE inhibitor/ARB metric.

Despite strong evidence in support of aspirin, beta-blockers and ACE/ARBs, the American College of Cardiology's Practice Innovation and Clinical Excellence outpatient registry shows that only 66.5% of cardiac patients receive the optimal, evidence-based combination of medications.[4] Our hope is to improve adherence to the aforementioned evidence-based standards of care within LVPG.

Methods

We used a LEAN approach to develop small tests of change within several practices. Our initial plan was to review charts and provide data to practices to assist them in a focused medication reconciliation. We were also testing whether this would be reflected by improvement in the dashboards on EPIC. Data was collected through patient chart review using the EPIC electronic medical record. Reports for each quality metric were generated using the My Report feature on EPIC. The antiplatelet quality metric was reviewed first. Reports were run for each of 7 practices within LVPG for the "antiplatelet use--not met" criterion. When the number of patients was too large to effectively search an additional narrowing criterion was added (i.e. patients' most recent beta-blocker prescription) to identify patients who had not been seen in the practice in >6 months. The chart of each patient listed on the report was then reviewed systematically. To summarize findings, a Microsoft Excel spreadsheet was constructed listing MRN, age of patient, date of upcoming appointments at that specific practice, date of last appointment at that practice, the practice name, PCP, cardiologist (if applicable), and whether the medications had been transferred from the CPO EMR, previously used by LVHN. If the patient's medication list had been transferred into EPIC from CPO and they were not currently on aspirin, past appointment notes, problem lists, and medications were investigated to determine the possible reasoning for not prescribing aspirin. Possible contraindications were recorded in the spreadsheet. These included simultaneous use of a blood thinner, history of hemorrhage, GI bleed/ulcer, possible fall risk, a diagnosis of severe kidney disease, use of NSAIDs, chronic steroid use, aspirin allergy, and any intolerance to aspirin. Color coding was used to organize data, specifically patients who had not been seen in one year, patients with medication list not transferred, and patients needing to be removed from the IVD registry due to improper diagnosis or false listing by the EMR.

A connection was then made with a registered nurse, clinical coordinator, or care manager in each practice. Individual meetings with the contacts for each practice were arranged and the Excel spreadsheet for their practice reviewed. The contact person then proceeded to reconcile medication lists as necessary, contact providers to review certain patients, and properly document allergies and intolerances. We found that medical staff often did not know how to properly document allergies, intolerances, and patient declinations in EPIC, so a step-by-step PowerPoint explaining the documentation processes was created as an educational tool. Additionally, providers and medical staff were taught how to view their practice metrics and run reports for their practice or specific patients. Individual practice graphs of the metric compliance were viewed on a weekly basis to track progress.

The same procedure was followed for the review of patients requiring a beta-blocker prescription. A similar Excel spreadsheet was used, with contraindications specific to beta-blockers, including bradycardia, hypotension, allergy, and intolerance such as lightheadedness or fatigue. One practice was reviewed. An additional practice was instructed on how to run the report themselves and the update charts as needed.

While attempting to repeat the process for patients needing ACE inhibitor/ARB prescriptions, it was discovered that the EPIC report captured patients with CAD and LVSD, but not those with CAD and DM. This overlooked approximately 90% of patients needing an ACE/ARB. For this reason, the metric was not extensively reviewed at the practice level. We worked with information services to update this metric in EPIC has since been updated, which can now be reviewed by practices in the future.

In an effort to make the project sustainable and ensure that quality metrics are appropriately addressed in the future, a workflow and other educational tools were created for the process specific to each metric reviewed in this project.

Results

Anti-platelet Quality Metric

Practices reviewed for the anti-platelet quality metric were Hamilton Internal Medicine, Cedar Crest Internal Medicine, LVPG Family and Internal Medicine Bethlehem Township, Lehigh Valley Physician's Practice, Emmaus Family Medicine, Cedar Crest Cardiology, Cedar Crest Family Medicine, and Hamburg Cardiology. A total of 733 charts were reviewed with 320/733 or 43.7% not currently or previously taking aspirin. The average increase in the anti-platelet metric was 11.0%.

Table 1: Summary of Data for All Practices for Anti-platelet Quality Metric

Possible Clinical and Pharmaceutical Contraindications	Percentage of Total Patients Reviewed	Percentage of Patients Not Currently/Previously on Anti-platelet
On a blood thinner	31.4%	46.9%
History of Hemorrhage	7.5%	11.6%
GI Bleed/Ulcer	7%	10%
Fall Risk	7.4%	9.7%
Severe Kidney Disease	10%	14.4%
Use of NSAIDs	5.9%	6.3%
Chronic Steroid Use	5.2%	8.1%
Allergy	5.2%	N/A
Aspirin listed in past notes	45.4%	N/A
Procedural Issues		**Percentage of Total Patients Reviewed**
Medications not transferred		39.8%
No upcoming appointment		51.7%
Patients not seen in the past year		14.6%

***Some patients had more than one possible contraindication**

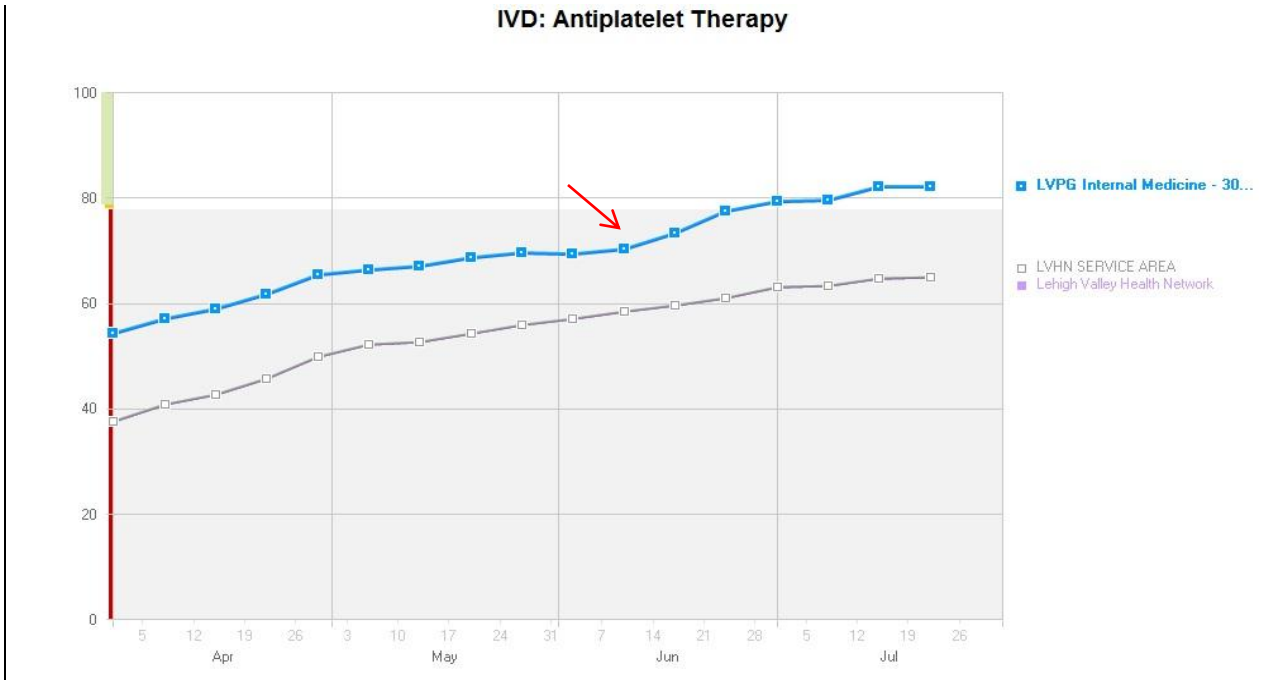

Figure 1: *Percentage of Patients on Anti-platelet for 3080 Hamilton Internal Medicine* The percentage of patients on anti-platelet began at 70.3% and ended at 82.1%, an increase of 11.8%. The goal of 77.7% was met. Intervention occurred week of June 14th.

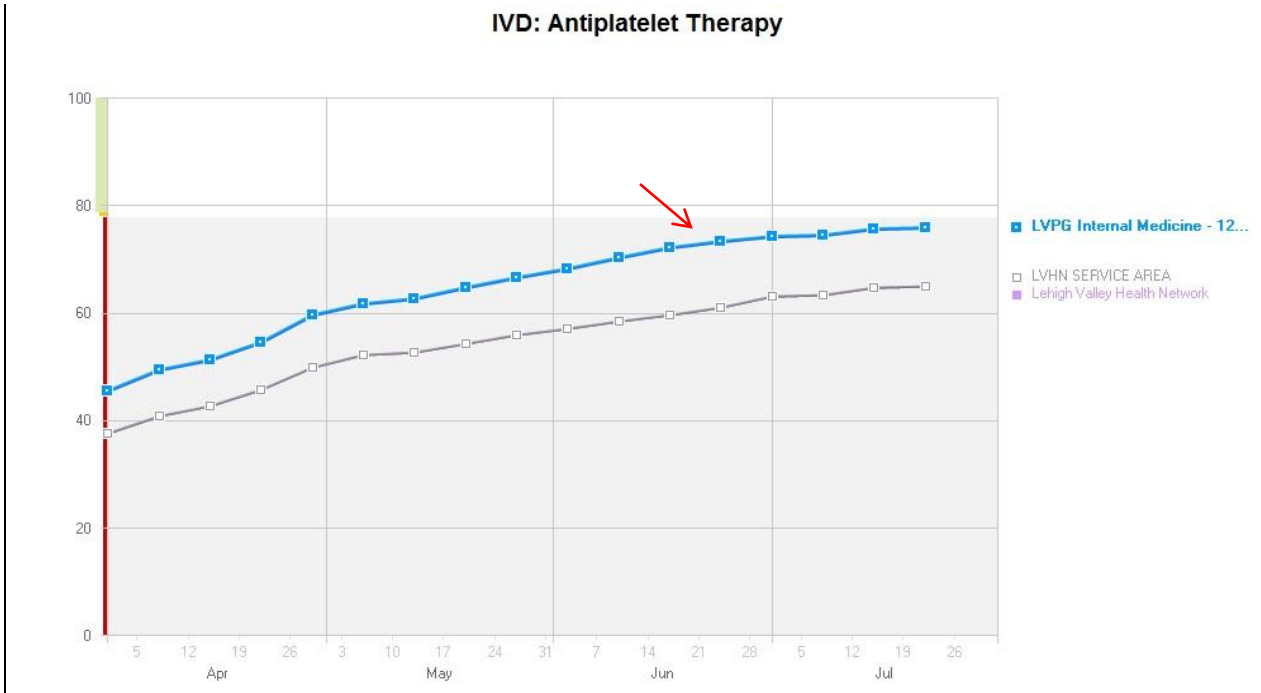

Figure 2: *Percentage of Patients on Anti-platelet for 1230 Cedar Crest Internal Medicine* The percentage of patients on anti-platelet began at 72.1% and ended at 75.9%, an increase of 3.8% No patient data was inputted into EPIC. Intervention occurred week of June 21st.

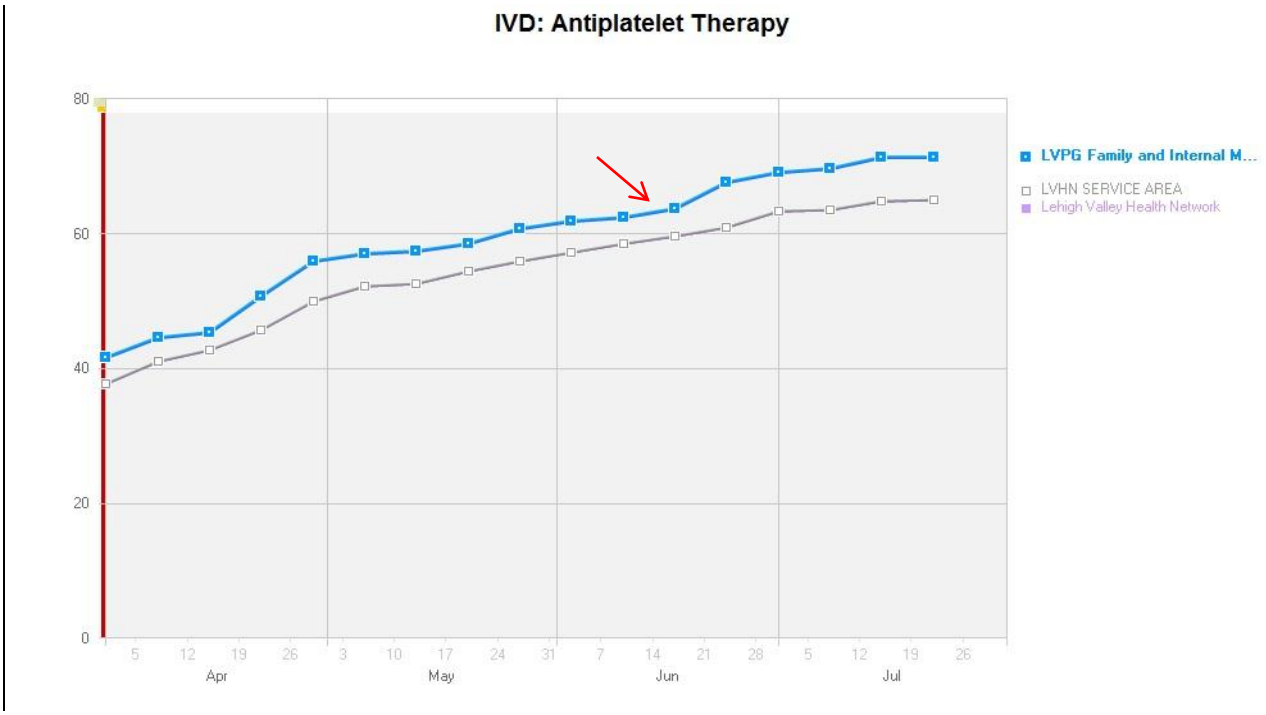

Figure 3: *Percentage of Patients on Anti-platelet for LVPG Family and Internal Medicine Bethlehem Township* The percentage of patients on anti-platelet began at 63.7% and ended at 71.3%, an increase of 7.6%. Intervention occurred week of June 14th.

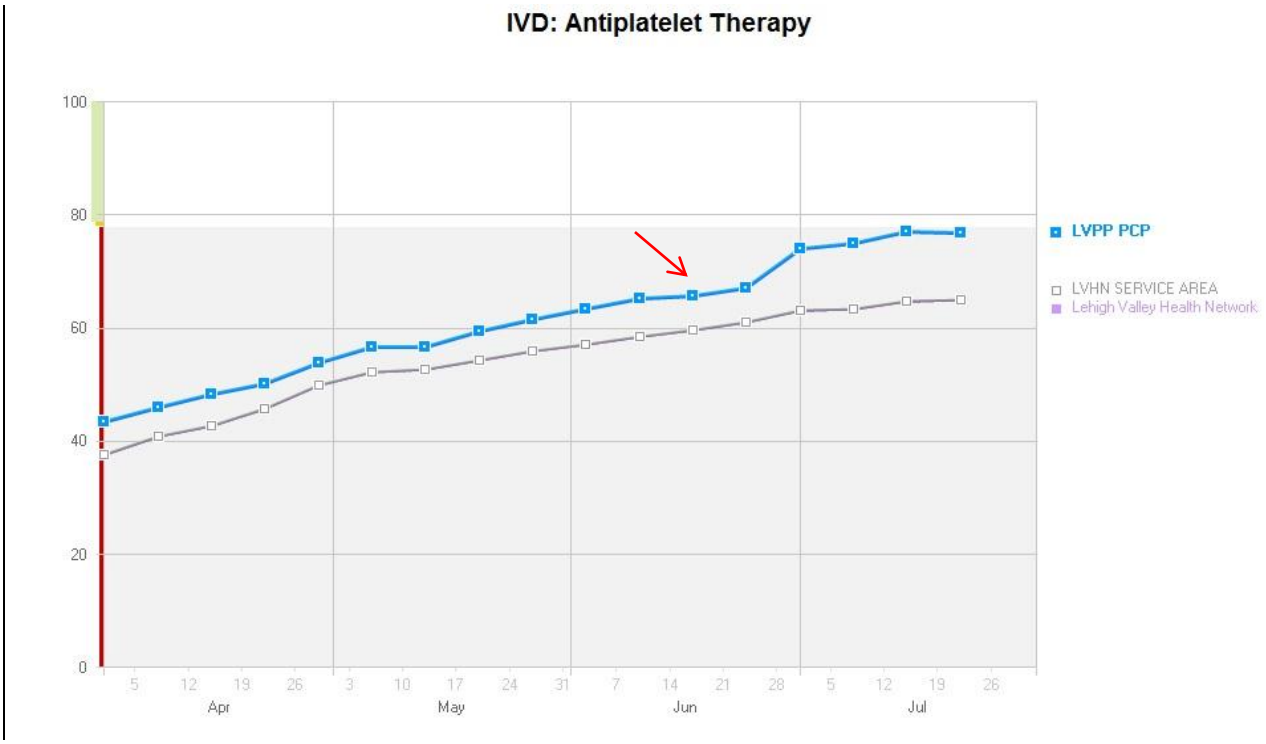

Figure 4: *Percentage of Patients on Anti-platelet for Lehigh Valley Physician's Practice* The percentage of patients on anti-platelet began at 67.1% and ended at 76.9%, an increase of 9.8%. Intervention occurred week of June 14th.

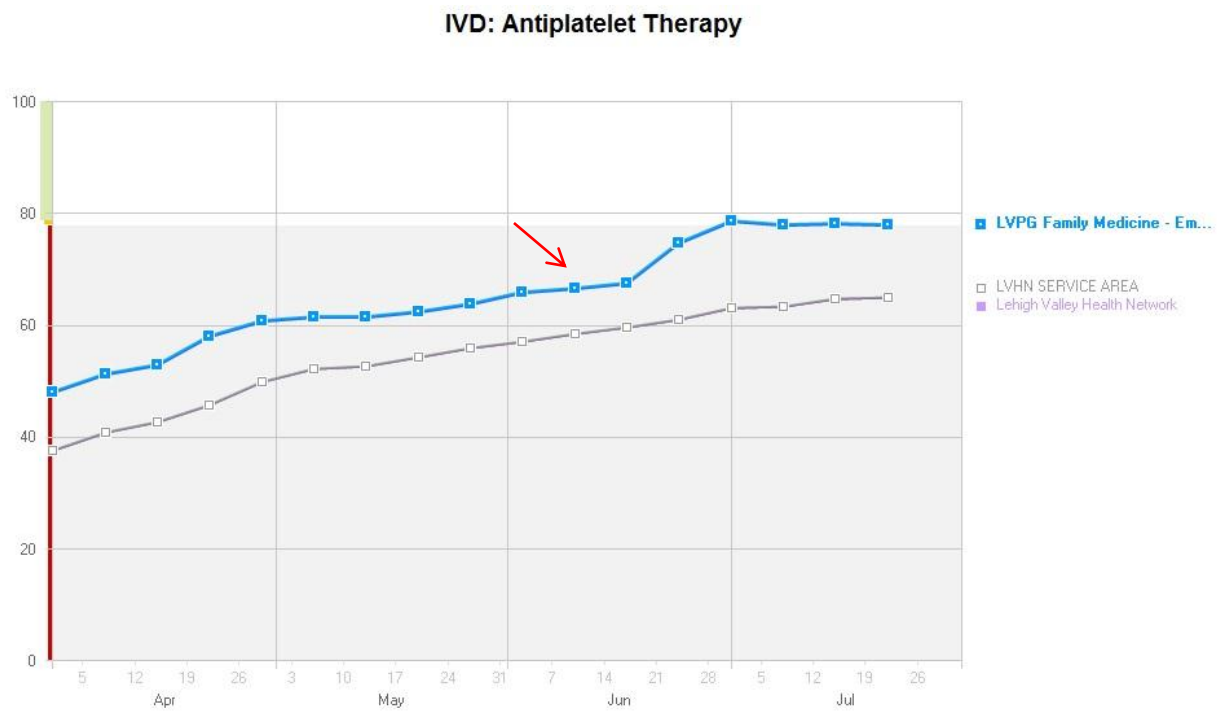

Figure 5: *Percentage of Patients on Antiplatelet for Emmaus Family Medicine* The percentage of patients on anti-platelet began at 67.7% and ended at 78.1%, an increase of 10.4%. The goal of 77.7% was met. Intervention occurred week of June 14th.

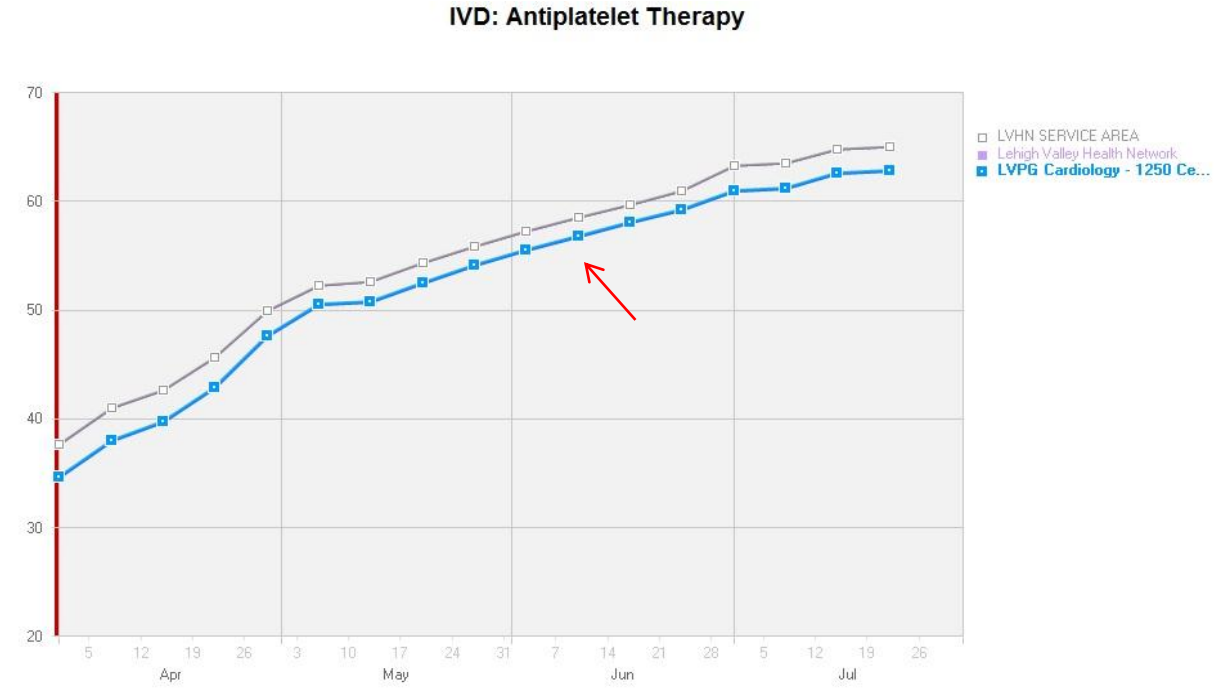

Figure 6: *Percentage of Patients on Anti-platelet for Cedar Crest Cardiology* The percentage of patients on anti-platelet began at 56.9% and ended at 62.8%, an increase of 5.9%. Intervention occurred week of June 14th.

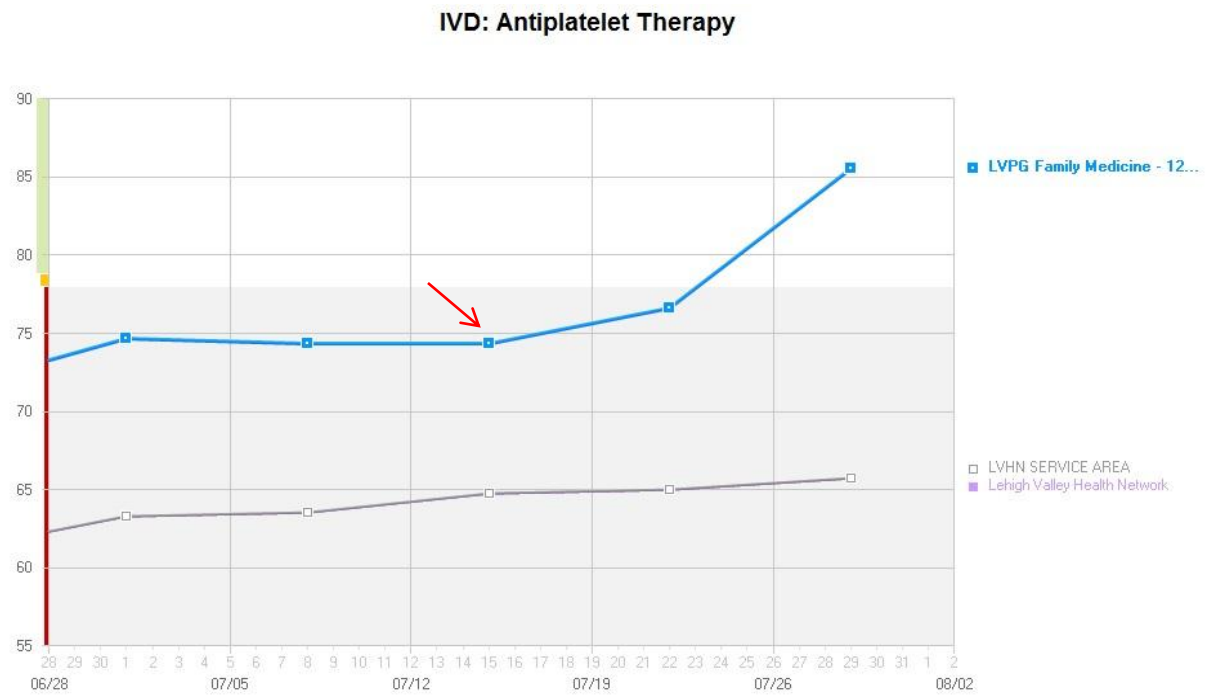

Figure 7: *Percentage of Patients on Anti-platelet for 1251 Cedar Crest Family Medicine* The percentage of patients on anti-platelet began at 74.3% and ended at 85.6%, an increase of 11.3%. The goal of 77.7% was met. Intervention occurred week of July 12th.

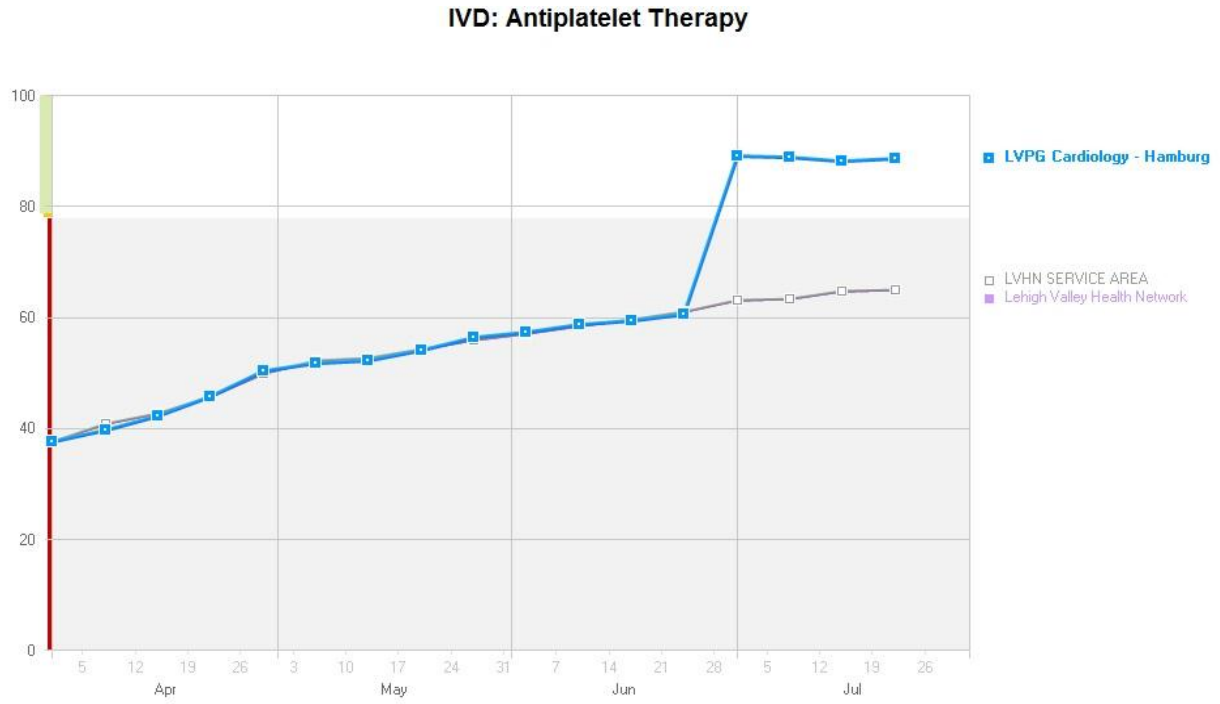

Figure 8: *Percentage of Patients on Anti-platelet for Hamburg Cardiology* The percentage of patients on anti-platelet began at 61.0% and ended at 88.6%, an increase of 27.6%. The goal of 77.7% was met. Intervention occurred week of June 21st.

Beta Blocker Quality Metric

Practices reviewed for the beta blocker quality metric were Cedar Crest Cardiology and 1251 Cedar Crest Family Medicine. Family medicine was completed independently by practice staff through use of education tools provided so the data is not included in Table 2. A total of 72 charts were reviewed with 5/72 or 6.9% not currently or previously taking a beta blocker. The average increase in the beta blocker metric was 13.0%.

Table 2: Summary of Data for All Practices for Beta-Blocker Quality Metric

Possible Clinical Contraindications	**Percentage of Total Patients Reviewed**
Severe Reactive Airway Disease	4.2%
Bradycardia	1.4%
Hypotension	2.8%
Intolerance	6.9%
Allergy	1.4%
Beta-blocker listed in past notes	76.4%
Procedural Issues	**Percentage of Total Patients Reviewed**
Medications not transferred	80.6%
No upcoming appointment	83.3%
Patients not seen in the past year	41.7%

***Some patients have more than one possible contraindication**

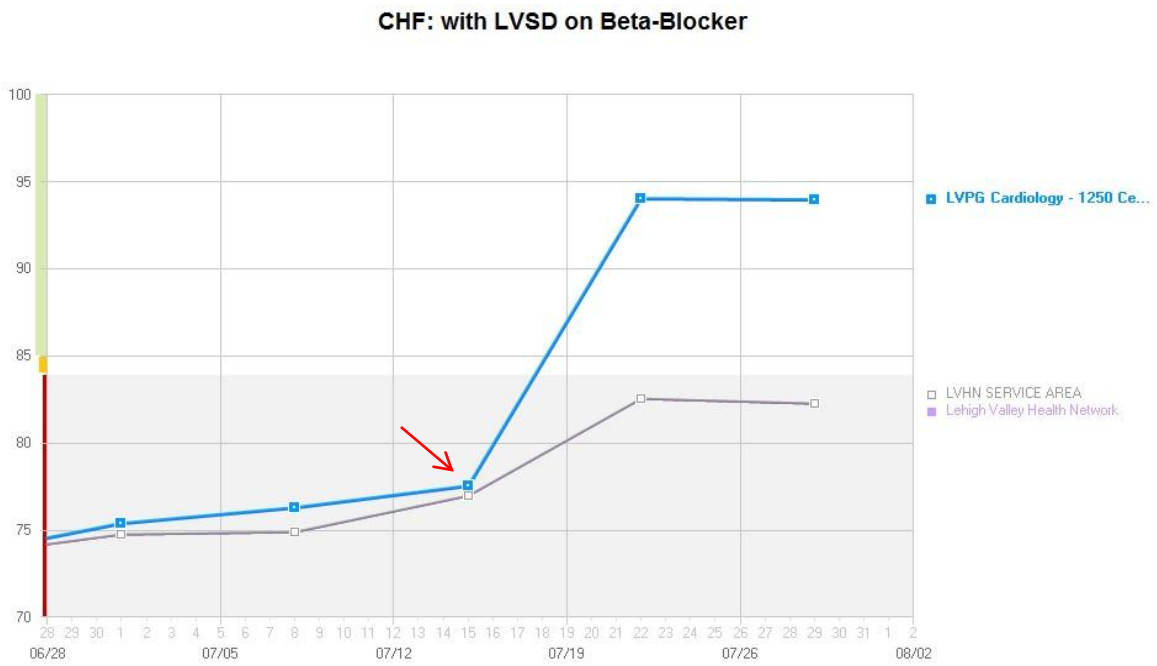

Figure 9: *Percentage of Patients on a Beta-Blocker for Cedar Crest Cardiology* The percentage of patients on a beta blocker began at 77.6% and ended at 93.9%, an increase of 16.3%. The goal of 83.4% was met. Intervention occurred week of July 19th.

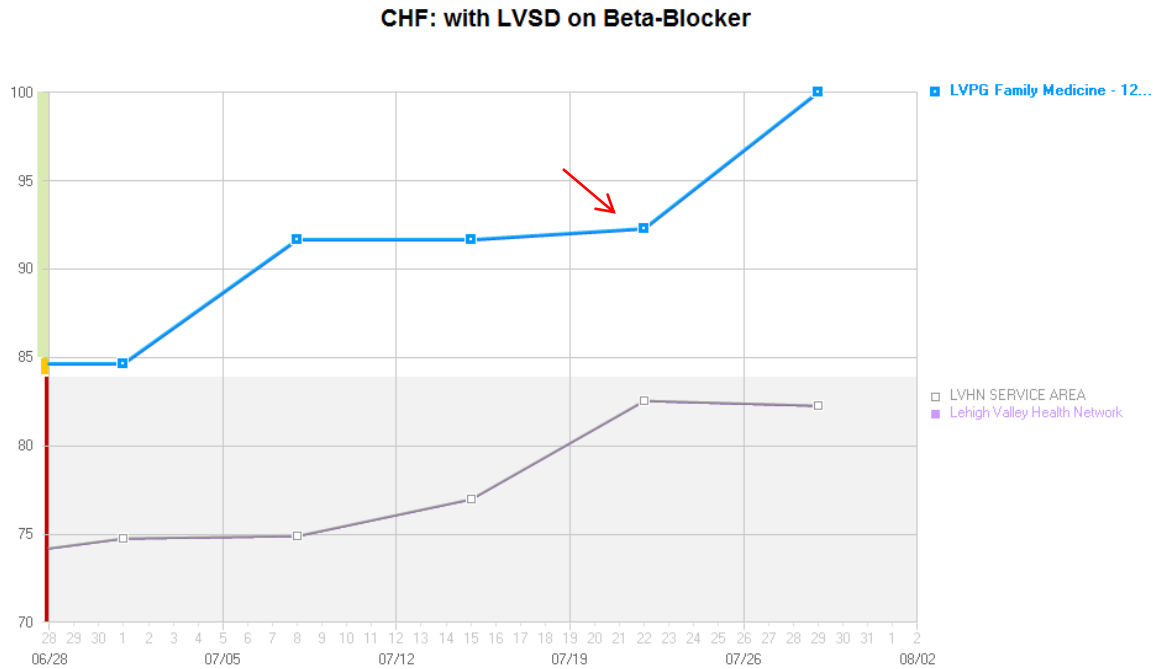

Figure 10: *Percentage of Patients on a Beta-Blocker for 1251 Cedar Crest Family Medicine* The percentage of patients on a beta-blocker began at 91.7% and ended at 100.0%, an increase of 8.3%. The goal of 83.4% was met. Educational tools were provided the week of July 19th.

ACE Inhibitor/ARB Quality Metric

Practices reviewed for the ACE/ARB quality metric were Hamilton Internal Medicine, LVPG Family and Internal medicine Bethlehem Township, and Cedar Crest Internal Medicine. Hamilton Internal Medicine was the only practice with data inputted into EPIC. A total of 212 charts were reviewed. The percentage of patients not currently or previously taking ACE/ARB was not recorded due to the different approach for this metric. Initially, a practice dashboard was not available so a large database was used.

Table 3: Summary of Data for All Practices for ACE/ARB Quality Metric

Possible Clinical Contraindications	**Percentage of Total Patients Reviewed**
Hypotension, angioedema, renal insufficiency, hyperkalemia, bradycardia	18.9%
Intolerance	2.8%
Allergy	7.5%
Procedural Issues	**Percentage of Total Patients Reviewed**
Medications not transferred	9.4%
No upcoming appointment	30.7%
Patients not seen in the past year	3.8%

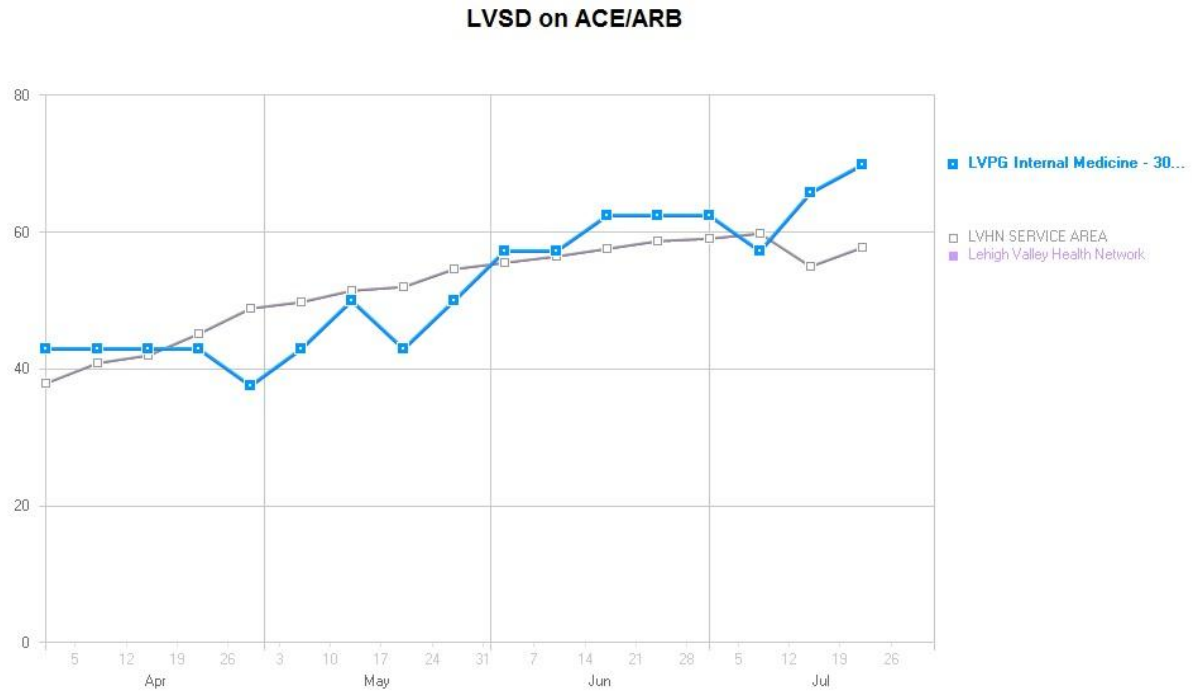

Figure 11: *Percentage of Patients on an ACE inhibitor/ARB for 3080 Hamilton Internal Medicine* The percentage of patients on an ACE/ARB began at 65.8% and ended at 69.9%, an increase of 4.1%. Intervention occurred the week of June 28th. Various slopes and non-linear trends can be observed due to changes in the definition for the metric and thus the population. Beginning the week of July 20th the correct definition was implemented.

Discussion

An overall analysis of the data for each metric clearly demonstrates specific data issues and clinical contraindications are the likely causes for non-adherence with metric guidelines. For patients with a diagnosis of IVD who should be prescribed an anti-platelet therapy, 39.8% did not have an updated medication list in EPIC. This allowed for a fairly quick clean-up of the data by providing each contact person a list of patient MRNs that needed medications lists to be reconciled. The most common antiplatelet metric relative contraindication, 31.4% of patients, was the additional prescription of a blood thinner. To address this, education tools were developed that include research supporting the use of dual therapy and calculators for assessing bleeding risk, to encourage appropriate management where indicated. Additional information for each contraindication was included in the developed education tools. It was also found that 39.8% of patients did not have an upcoming appointment. This is potentially problematic for future metric analysis, as appointments are needed to discuss and prescribe medications. To address this problem, patients without future appointments were noted in the data provided to each practice. A unique problem for cardiology practices is that EPIC currently does not allow for easy review of individual cardiologists' patients, as it does for PCPs. Additionally, as consultative practices, patients are seen less frequently and often have PCPs outside of LVPG, resulting in less patient data in EPIC. The review of 733 charts for the antiplatelet metric led to increases in the metric compliance percentage for all practices with an average increase of 11.0%. When analyzing the graphs in EPIC, it is important to consider the population size. Smaller practices show more of an increase in the patient adherence percentages.

Similar trends were observed for the beta-blocker metric, with 80.6% of patients not having transferred medication lists and 83.3% not having an upcoming appointment. Due to time constraints, the beta-blocker metric was only analyzed for one practice. The contact at 1251 Cedar Crest Family Medicine was taught how to follow the standardized protocol, and the results reflect their work. The most

common contraindication for beta-blockers was an intolerance to the medication, most often fatigue. As a result of the project, the percentages of patients on beta-blockers at three practices now meet Medicare's Metric standard of 83.4%. Rapid improvement of this metric was partially a result of the small number of patients requiring a beta-blocker and the limited number of contraindications.

The ACE inhibitor/ARB metric proved to be difficult due to the multiple changes made in the EPIC definition of patients included in the metric. Initially, diabetic patients were not included, resulting in approximately 90% of the patient population indicated for ACE inhibitors/ARBs to not be listed in the report. It was found that clinical contraindications were the most commonly cited reason (18.9%) for non-compliance with this metric. A high percentage of patients (30.7%) again did not have upcoming appointments. Analysis of each practice's graph shows inconsistent and non-linear trends, associated with the changing definitions. For this reason it cannot be determined how this project influenced the metric. Beginning the week of July 20th the metric definition began to also include patients with CAD and diabetes. Therefore, only the most recent week of data can be considered accurate.

Conclusion

The results of this quality improvement project show promise and effectiveness for the future. Generating EPIC reports and subsequently reviewing patient charts provides an efficient workflow for quality metric improvement. To ensure the sustainability of this work, multiple education tools have been developed. To decrease provider difficulties with accurate documentation and chart review, a collection of power-points were developed: step-by-step EPIC screenshot instructions for documenting allergies, intolerances, contraindications, and declinations, as well as a detailed PowerPoint for how to generate, customize, and filter reports for each metric.

To enable any qualified professional in a practice to conduct quality metric improvement, workflows were created in both a single page format and a more detailed booklet. It is recommended responsible person in each practice is identified to review reports regularly, first to improve the registries by updating medications, then to focus on patients with upcoming appointments not receiving standard of care medications. Once each metric reaches the preset goal, periodic review is recommended. Overall, the goal of quality metric improvement for CAD, CHF, and IVD measures was achieved, and a variety of tools were developed to ensure continued sustainability of improvement of evidence-based care metrics.

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